

TITLE OF THE INVENTION

METHOD FOR CONTROLLING POSITION OF INDICATOR

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from an application entitled *Method for Controlling Position of Indicator* earlier filed in the Korean Industrial Property Office on 15 October 1998, and there duly assigned Serial No. 98-43162 by that Office.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an interface apparatus and process using menus, and more particularly, to an apparatus and process for controlling the position of an indicator on the screen of a video display device.

Description of the Related Art

Different circuits and processes enabling a user to interface with an appliance by using menus has been widely used for information processing devices such as computers and television receivers. In these interface methods, the requirement of a user is received through menus displayed on a screen, and a desired item is selected by moving an indicator such as a pointer. The indicator

1 is usually a typical pointer, and a work or task bar which is inverted or highlighted. The pointer is
2 operated by a trackball or a joy stick installed on a remote controller, and the bar is operated by a
3 channel up and down key or a volume up and down key installed on a controller or a panel.

4 For instance, in a television receiver having a small number of selectable channels, a
5 particular channel is selected via one of ten keys or a channel up and down button of the remote
6 controller, but in a digital television receiver having substantially more selection channels, programs
7 of various channels are obtained through a program guide screen, and a specific channel for a
8 particular program is selected through a pointer. Adjustment of display, time setting, and control
9 of volume as well as channel selection can be interfaced through a menu.

10 In the interface method using menus, when a selected menu item has sub menus or
11 adjustment items, corresponding sub menus are displayed on the screen. For instance, for the control
12 of volume, sub menus for selecting left/right/center/surround speakers are displayed. When the left
13 speaker is selected, a slide-bar displays an adjustment screen for adjusting the volume of the left
14 speaker.

15 A user selects a desired sub menu item from the displayed sub menus or moves a pointer for
16 changing the adjustment state.

17 However, in the conventional interface method, the sub menus are displayed but the pointer
18 is located in a position in which main menu items are selected so that the pointer must be moved to
19 an area where the sub menus are displayed. When the sub menus are displayed in a position far from
20 the main menu, an excessive amount of time is wasted in moving the pointer, which causes
21 inconvenience in interfacing with a user.

Also, in the conventional interface method, even if the position and the scale of the menu are changed, the position of the pointer is not changed so that the pointer must be moved by a user to an area where the changed menu is displayed. In the case of using a cursor controller such as trackball or a remote controller to operate a pointer, when the response is very slow, the amount of time taken to move the pointer is increased so that the interface method using menus may be regarded as being difficult.

An exemplar of the contemporary, Choi (U.S. Patent 5,648,781, *Method and Apparatus for Remotely Controlling Electrical Appliances Using a Trackball and Display*, July 15, 1997) discloses a remote control method and apparatus. The remote control for electrical appliances has a trackball used to select functions using control menus. The movement for the pointer is fully dependent upon a user's movement of the trackball. The initial location of the pointer is not limited to the menu area. The pointer can be anywhere on the display screen. When a user goes to a submenu and then reverts back to the main menu, the pointer does not follow the menu area. A user has to make extra steps in having to move the trackball to find the previous menu area.

Morito (U.S. Patent 5,448,240, *Remote Control Input Device*, September 5, 1995) discloses an input device comprised of a rotatable cylinder shape. The device is limited to a direction on one axis at a time. Free movement in all directions of a pointer device is not allowed.

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a1 ~~Kayashima et al. (U.S. Patent 5,488,427, *Television System Including Television Set, and Accessory Devices Controlled by a Single Remote-Control Device*, January 30, 1996) discloses a television system having method and apparatus for selecting preset or use determined devices. A remote control device is shown to have buttons to display and select an on screen menu. Menu items~~

are selecting by selecting the corresponding buttons on the remote control. The item selected is shown on the display. A problem with Kayashima et al. '427 is that it requires too many buttons for rapidly and conveniently controlling a television.

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Q2 ~~Yamamoto (U.S. Patent 5,457,446, *Control Bus System with Plural Controllable Devices*, October 10, 1995) discloses a control bus system for a home entertainment system. The control bus further comprises a display means for displaying the features to be executed by the control bus. A cursor is moved to display item to be selected. Yamamoto '446, requires extra movement to locate the area to be selected.~~

Buchner et al. (U.S. Patent 5,532,753, *Remote-Controlled On-Screen Audio/Video Receiver Control Apparatus*, July 2, 1996) discloses a remote controlled device that displays its options on a display screen. The pointer is controlled by apparatus like a trackball, joy stick or touch panel. The pointer is freely moving with the control screen. Buchner et al. '753 does not store the area location of a previous menu so when a user reverts to an old menu, the pointer is not situated in same area.

I have found that in devices such as a digital television having many selection and adjustment items which cannot be smoothly operated by direct operation of a key, the interface using menus is very important for marketing the devices, so that ensuring of quick response for selecting menus is very important.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method of controlling the position of an indicator in an interface using a menu in which an indicator follows to the menu in accordance with the generation and change of the menu, to thereby ensure quick response for selecting the menu.

^{INS}_{a3} According to an embodiment of the method for controlling the position of an indicator of the present invention, to achieve the above object, when a menu having items selected and adjusted by the indicator is displayed, and an item having sub items capable of being selected and adjusted is selected, the sub items are displayed and the indicator is located in the area where the sub items are displayed.

According to another embodiment of the method for controlling the position of an indicator of the present invention, to achieve the above object, when a menu having items selected and adjusted by an indicator is displayed, and the position and a size of the menu are changed, the indicator follows the changed menu.

BRIEF DESCRIPTION OF THE DRAWINGS

The above object and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

FIG. 1 is a view for conceptually showing an interface method using menus;

FIG. 2 shows the appearance of the remote controller of FIG. 1;

FIG. 3A is an example of a menu screen in the interface method;

FIG. 3B is a screen when a menu item including a sub menu is selected from the menu of FIG. 3A;

FIG. 4A is another example of a menu screen in the interface method;

FIG. 4B is a screen when the menu of FIG. 4A is enlarged;

FIG. 5A is an example of a reduced program guide screen in the interface method;

FIG. 5B is an example of when the program guide of FIG. 5A is enlarged;

FIG. 6 is a flowchart of an embodiment of a method for controlling the position of an indicator according to the present invention;

FIG. 7 shows a screen generated by the method of FIG. 6;

FIG. 8 is a flowchart of another embodiment of a method for controlling a position of an indicator according to the present invention;

FIG. 9A shows a reduced menu of a screen generated by the method of FIG. 8;

FIG. 9B shows an enlarged menu of a screen generated by the method of FIG. 8;

FIG. 10 is a flowchart of still another embodiment of a method for controlling the position of an indicator according to the present invention;

FIGS. 11A and 11B are screens generated by the method of FIG. 10;

FIG. 12 shows the structure of data for menu items;

FIG. 13 is for showing the relationship between menu items and sub menu items thereof;

FIG. 14 shows an example of a menu item region displayed on a screen;

FIG. 15 is a block diagram showing the structure of an apparatus in which the method of FIG.

6 is used;

FIG. 16 is a block diagram showing the structure of another apparatus in which the method of FIG. 8 is used; and

FIG. 17 is a block diagram showing the structure of an apparatus in which the method of FIG. 10 is used.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 conceptually shows a interface method in which the television receiver is controlled by a remote controller. The television receiver 200 is controlled by the remote controller 100 of FIG. 1. The television receiver 200 displays a menu screen for a user's selection, and a desired item is selected from the menu items displayed on the screen by a pointer. Also, the desired item can be selected from the menu items displayed on the screen by operation of an inverted or highlighted bar. The display screen can be for example a cathode ray tube, liquid crystal display, projection screen, or any other similar display devices.

Referring to FIG. 2, a remote controller includes a power supply key 20, a trackball 22, a selection key 24, a menu key 26, an enlargement and reduction key 28, and a program guide key 30. The menu key 26 is a key for displaying a main menu on a screen, the trackball 22 is a device for moving the pointer displayed on the screen, and the selection key is a key for selecting a menu item on which the pointer is located. Other pointing devices or cursor controllers may be used like a mouse, touchpad, and joy stick. The enlargement and reduction key 28 is a key for enlarging or reducing the size of the menu displayed on the screen, and the program guide key 30 is a key for displaying program guide information on the screen. The pointer can be moved by a joystick, a channel up and down key or a volume up and down key as well as the trackball 22.

1 In the television receiver 200, a main menu is displayed on the screen or erased in response
2 to pressing the menu key 26. That is, the menu key 26 operates as a toggle key. When the menu is
3 displayed on the screen, the pointer for selecting the menu also is displayed.

4 In the television receiver 200, the position of the pointer displayed on the screen is controlled
5 in response to operation of the trackball 22, and operation allocated to the menu item on which the
6 pointer is located is performed in response to the selection key 24. If the selected menu item
7 includes sub menus, the sub menus are displayed.

8 In the television receiver 200, the size of a menu is enlarged or reduced in response to the
9 enlargement and reduction key 28. In order to reduce the size of the menu, a screen is divided into
10 two parts. A program image is displayed in one part, and a menu is displayed in the other part. In
11 order to enlarge the size of the menu, the enlarged menu is displayed on the screen.

12 The remote controller 100 periodically detects the position of the trackball 22 to control the
13 position of the pointer, and transmits changes in position corresponding to the detected position.
14 That is, the remote controller 100 reads the direction to which the pointer is to be moved, through
15 the trackball 22, and transmits a signal that moves the pointer in the same direction as the trackball
16 22. For instance, when a user moves the trackball 22 to the left for three seconds, the signal for
17 periodically moving the pointer to the left is transmitted to the television receiver 200 for three
18 seconds.

19 In the television receiver 200, the position of the pointer is changed in response to the signal
20 transmitted from the remote controller 100. When the pointer is located on the item which is to be
21 selected by the pointer, the user presses the selection key 24 of the remote controller 100, and the
22 television receiver 200 performs the command corresponding to the selected item.

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1 ~~FIG. 3A which shows an example of a menu screen in a interface method where a menu is~~
2 overlapped with a program image. In FIG. 3A, reference numeral 32 denotes a pointer, and reference
3 ~~numeral 34 denotes a main menu.~~

4 FIG. 3B is a screen after a menu item corresponding to a sub menu has been selected from
5 the main menu 34 of FIG. 3A. In FIG. 3B, reference numeral 36 denotes a sub menu.

6 In the bar of FIG. 3B, the pointer is located on the selected main menu item.

7 As shown in FIG. 3B, when the distance between the main menu 34 and the sub menu 36 is
8 long, much time is required for moving the pointer 32 to select a sub menu item.

9 Referring to FIG. 4A, in the television receiver 200, the menu reduced in response to the
10 menu key 26 of the remote controller 100 is displayed. In order to display the reduced menu, the
11 screen of the television receiver 200 is divided into two parts. A program image is displayed in one
12 part, and a menu is displayed on the other part.

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13 ~~In FIG. 4A, reference numerals 40, 42, 44 and 46 denote an image where a program image~~
14 ~~signal is displayed, a pointer, a main menu and an area where the menu is displayed.~~

15 As shown in FIG. 4A, the pointer 42 is located in a position before the menu is displayed.
16 Thus, in order to select a menu item, the pointer 42 must be moved to the menu 44.

17 FIG. 4B shows a screen when the enlargement and reduction key 28 is pressed for the screen
18 of FIG. 4A. In FIG. 4B, the menu 44 enlarged in response to the enlargement and reduction key 28
19 of the remote controller 100 is displayed.

20 Also, only the enlarged menu 44 is displayed on the screen.

21 As shown in FIG. 4B, the pointer 42 is located in the position before the menu 44 is enlarged.
22 Thus, in order to select the menu item, the pointer 42 must be moved to the menu 44.

1 In FIG. 5A, the program list which is reduced in response to the program guide key 30 of the
2 remote controller 100 is displayed. In order to display the reduced program list, the screen of the
3 television receiver 200 is divided into two parts. Here, a program image is displayed in one part, and
4 the program list is displayed on the other part.

5 In FIG. 5A, reference numerals 50 denotes an area where the program image is displayed,
6 52 denotes a pointer, 54 denotes a program list and 56 denotes an area where the program list is
7 displayed. As shown in FIG. 5A, the pointer is located in the area where the program image is
8 displayed.

9 In FIG. 5B, the program list 54 has been enlarged in response to the enlargement and
10 reduction key 28 of the remote controller 100 and the enlarged program list is displayed. As shown
11 in FIG. 5B, the pointer 52 is located in the position before the program list 54 is enlarged.

12 In a method for controlling the position of an indicator according to the present invention,
13 in order to display a menu or a program list, the indicator is located in a menu area or a program list
14 area, so that it is unnecessary to move the pointer to the menu area or the program list area.

15 In a method shown in FIG. 6, a sub menu 36 is displayed on a screen in response to the menu
16 key 26 of the remote controller 100 (S600).

17 The pointer 32 is located in the sub menu area (S605). When the sub menu 36 is displayed,
18 the pointer 32 is located on the sub menu area, so that the sub menu item can be easily selected.

19 Then, the position of the pointer 32 is controlled in response to the trackball 22 of the remote
20 controller 100 (S610).

21 The remote controller 100 periodically transmits the amount of change in the x and y-
22 directions in accordance with operation of the trackball 22, in order to move the pointer 32. In the

1 television receiver 200, a new coordinate value is calculated by adding the amount of change
2 transmitted by the remote controller 100 to the coordinate value where the pointer 32 is located, and
3 the pointer is displayed on the calculated coordinate value.

4 Then, the sub menu allocated to the sub menu item where the pointer 32 is located is
5 performed in response to the selection key 24 of the remote controller 10 (S620).

6 By the method of FIG. 6, the pointer 32 is located on an area where the sub menu 36 is
7 displayed so that the sub menu item can be selected by minimum operation.

8 The position where the pointer 32 is located may be the first sub menu item. FIG. 7 shows
9 a screen which results from performing step 605. Comparing the interface method illustrated by
10 FIG. 3B to the method for controlling a position of an indicator according to the present invention
11 of FIG. 7, when the sub menu 36 is displayed, the pointer 32 is located in the sub menu area so that
12 time for moving the pointer 32 to the sub menu area is reduced.

13 As shown in FIG. 6, when the sub menu 36 is erased, the pointer 32 is located in the selected
14 menu item. Thus, the selected item is stored, and the pointer is located in the stored menu item when
15 the sub menu 36 is erased.

16 Referring to FIG. 8, the menu reduced in response to the menu key 22 of the remote
17 controller 100 is displayed, and the menu is enlarged and reduced in response to the enlargement and
18 reduction key 28. In reducing the menu, the screen of the television 200 is divided into two parts.
19 A program image is displayed in one part, and a menu is displayed in the other part (S800). Only
20 the enlarged menu is displayed on the screen.

1 Referring also to FIGS. 9A and 9B, the pointer 42 is located on the menu area (S805). In
2 order to reduce or enlarge the menu 44, the pointer 42 is located on the menu area so that the menu
3 item can be easily selected.

4 The position where the pointer 42 is located may be the first menu item.

5 FIGS. 9A and 9B show reduced and enlarged menu screens that result from performing step
6 805.

7 Comparing the interface method of FIG. 4A to the method for controlling the position of an
8 indicator according to the present invention, when the reduced menu is displayed, the pointer 42 is
9 located in a menu area so that the time taken to move the pointer 42 to the menu area is reduced.

10 Also, comparing the interface method of FIG. 4B to the method for controlling the position
11 of an indicator of FIG. 9B according to the present invention, when the enlarged menu is displayed,
12 the pointer 42 is located in the menu area so that the time taken to move the pointer 42 to the menu
13 area is reduced.

14 The position of the pointer 42 is controlled in response to the trackball 22 of the remote
15 controller 100 (S810).

16 The television receiver 200 performs a command allocated to the menu item where the
17 pointer 42 is located in response to the selection key 24 of the remote controller 100 (S820). When
18 the selected menu item includes the sub menu, the sub menu and the pointer are displayed according
19 to the method of FIG. 6.

20 The method of FIG. 8, which is adopted to the case of reducing and enlarging the menu, can
21 be adopted to the case of changing the position of the menu. Here, the position of the pointer is
22 moved by the moving degree of the menu.

1 In the method of FIG. 10, a reduced program list is displayed in response to the program
2 guide key 30 of the remote controller 100, and the enlarged or reduced program list is displayed in
3 response to the enlargement and reduction key 28. In order to display the reduced program list, the
4 screen is divided into two parts. Referring also to FIGS. 11A and 11B, a program image is displayed
5 in one part, and a program list 54 is displayed in the other part (S1000).

6 Only the enlarged program list 54 is displayed on the screen.

7 ~~The pointer 52 is located in a program list area (S1005). When the program guide image id~~
8 ~~displayed, the pointer 52 is located in the program list area so that a desired program can be easily~~
9 ~~selected.~~

10 An item where the pointer 52 is located may be the first channel.

11 FIGS. 11A and 11B which show screens resulting from step 1005 show reduced and enlarged
12 program lists.

13 Comparing the interface method of FIG. 5A to the method for controlling the position of an
14 indicator of FIG. 11A according to the present invention, when the program list is displayed, the
15 pointer 52 is located in a program list area so that the amount of time taken to move the pointer 52
16 to the program list area is reduced.

17 Comparing the interface method of FIG. 5B to the method for controlling a position of an
18 indicator of FIG. 11B according to the present invention, when the enlarged program list is
19 displayed, the pointer 52 is located in the program list area so that the amount of time taken to move
20 the pointer 52 to the program list area is reduced.

21 The position of the pointer 52 is controlled in response to the trackball 22 of the remote
22 controller 100 (S1010).

The television receiver 200 performs a command allocated to the item where the pointer 52 is located in response to the selection key 24 of the remote controller 100 (S1020). When a channel is selected, detailed information on the channel is displayed, and when a program is selected, detailed information on the selected program is displayed.

Ans a7 Referring to FIG. 12, data for the menu item is comprised of an identifier 120, area information 122, information 124 indicating whether the sub menu exists or not, address information 126 indicating a position where information on a sub menu is stored, and command information 128 indicating a command allocated to the menu item when there is no sub menu.

The identifier 120 indicates the name of the menu item. The area information 122 indicates coordinate information of areas where the corresponding menu item is displayed, and has coordinate information of two points of a diagonal line of a general tetragon. When the selection key 24 is pressed, the television receiver 200 determines to which area information the coordinate value where the pointer is located belongs and identifies the selected menu item.

The menu item has sub menus so that the menu has a tree structure as shown in FIG. 13. In FIG. 13, main menu items main # 1, main # 2, and main # 3 have respective sub menus.

Menu items of FIG. 14 have an area of a tetragon indicated by $(x1, y1)(x2, y2)$. The pointer is located at the center point of the tetragonal area of the menu item. The coordinates of the center point of the tetragon area are $((x1+x2)/2, (y1+y2)/2)$.

When the menu screen is displayed, the pointer is located in the first item of the menu screen. In FIG. 6, the coordinates where the pointer is located are $((x1+x2)/2 + x, (y1+y2)/2)$. Here, reference character x indicates an offset in accordance with reduction and enlargement of the menu

1 which is a value from the left of the screen. When the position of the menu is changed, the
2 movement amount (x_m , y_m) of the menu is adopted.

3 FIG. 15 shows a more detailed view of the remote controller 100 and the television receiver
4 200 of the present invention. The remote controller 100 includes a menu key 152, a selection key
5 154, a trackball 156, a trackball movement sensor 158, a data generator 160, a control commander
6 162 and a transmitter 164.

7 The television receiver 200 includes a receiver 252, a menu display unit 254, a menu
8 information storage unit 256, a pointer display unit 258, a menu performer 256 and a screen
9 generator 262.

10 When the menu key 152 of the remote controller 100 is pressed, the data generator 160
11 generates a menu display command.

12 The menu display unit 254 obtains information of the main menu from the menu information
13 storage unit 256 in response to the menu display command received through the receiver 252, and
14 displays the main menu corresponding thereto.

15 At this time, the pointer display unit 258 displays the pointer on a center point with reference
16 to the area information of the item where the pointer is to be located.

17 When the trackball 156 is moved to select the corresponding menu item from the menus
18 displayed on the screen, the trackball movement sensor 158 senses the movement of the trackball
19 156 in the x and y-directions. The data generator 160 periodically generates a pointer movement
20 command which includes the amount of change in position sensed by the trackball movement sensor
21 158. The pointer movement command of the data generator 160 is transmitted by the transmitter
22 164.

1 The receiver 252 receives a pointer movement signal generated by the transmitter 164 of the
2 remote controller 100. The pointer display unit 258 controls the position of the pointer in response
3 to the received pointer movement signal.

4 When the selection key 154 of the remote controller 100 is pressed, the menu performer 260
5 performs a command of the menu item where the pointer is located in response to the menu item
6 selected by the selection key 154.

7 When the selected menu item includes sub menu items, the menu performer 260 controls the
8 menu display unit 254 to thereby display the sub menu. The menu display unit 254 obtains
9 information on the sub menu from the menu information storage unit 256 and displays the sub menu
10 corresponding to the information.

11 The pointer display unit 258 displays a pointer in the center point of the item where the
12 pointer is to be located, with reference to the area information.

13 The screen generator 262 overlaps the menu image signal generated by the menu display unit
14 254 with an image signal and supplies the overlapped signal to a display unit (not shown).

15 In FIG. 16, portions which perform the same operations as those of FIG. 15, are assigned by
16 the same reference numerals.

17 In FIG. 16, reference numeral 166 denotes an enlargement and reduction key, and reference
18 numeral 264 is a screen divider in which a menu image signal generated by the menu display unit
19 254 and a program image signal generated by a tuner (not shown) are synthesized or each signal is
20 displayed.

21 When the enlargement and reduction key 166 of the remote controller 100 is pressed, the data
22 generator 160 generates enlargement and reduction commands. When the enlargement and reduction

key 166, a toggle key, is pressed once, the enlargement command is generated, and when the key is pressed once more, the reduction command is generated.

The menu display unit 254 obtains information on the main menu screen from the menu information storage unit 256 in response to the enlargement and reduction commands received through the receiver 252, and displays the corresponding menu.

At this time, the pointer display unit 258 displays the pointer in the center point of the item where the pointer is to be located, with reference to the area information.

The screen divider 264 synthesizes program image signal and menu image signal generated by the menu display unit 254 or displays each signal on the screen, and supplies the signals to a cathode ray tube (CRT, not shown).

FIG. 17 is a block diagram showing the structure of an apparatus in which the method of FIG. 10 is used.

Portions of FIG. 17 which perform the same operations as those of FIG. 16, are assigned by the same reference numerals. In FIG. 17, reference numeral 266 denotes a program guide information storage for storing program guide information detected from the image signal. The program guide information includes a name of the program, guide information, and data of starting time and ending time.

LNS 28 ~~The program guide information generator 254 obtains program guide information from the program guide information storage 366 in response to the program guide command received through the receiver 252, and generates a corresponding program guide image signal.~~

At this time, the pointer display unit 258 displays the pointer on the item with reference to the area information of the program item where the pointer is to be located.

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1 ~~When the enlargement and reduction key 166 of the remote controller 100 is pressed, the data~~
2 generator 160 generates enlargement and reduction commands. When the enlargement and reduction
3 key which is a toggle key is once pressed, the enlargement command is generated, and when the key
4 ~~is more once pressed, the reduction command is generated.~~

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5 ~~The program guide information generator 254 obtains program guide information from the~~
6 program guide information storage 366 in response to the enlargement and reduction command
7 received through the receiver 252, and displays corresponding enlargement and reduction program
8 ~~list.~~

At this time, the pointer display unit 258 displays the pointer in the center point with reference to the area information of the item where the pointer is to be located.

The receiver 252 receives a pointer movement signal generated by the transmitter 164 of the remote controller 100. The pointer display unit 258 controls the position of the pointer in response to the received pointer movement signal.

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9 ~~When the selection key of the remote controller 100 is pressed, corresponding command is~~
10 performed. For instance, in order to select a program, the program guide performer 268 obtains a
11 channel number of the program where the pointer is located and supplies the obtained channel
12 ~~number to the tuner 270.~~

When the reduced program list is displayed, the screen divider 262 synthesizes program image signals and program guide image signals generated by the menu display unit 254 or each signal is displayed, and supplies the signal to a display unit (not shown).

1 The present invention in which a selection item is commanded by a pointer has been
2 described, can be adopted to the case of changing colors of the selected item, i.e., highlighting or
3 inverting colors of the selection item.

4 According to the interface method of the present invention, an indicator is located in one of
5 the selection items when the selection items are displayed so that only a small amount of movement
6 is required by the indicator, which enables easy interfacing with users.

7